

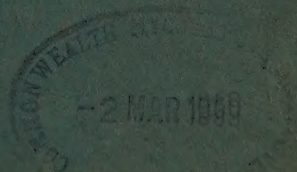
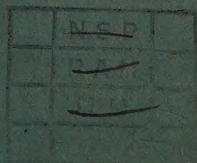


The
Imperial Forestry Institute
University of Oxford

THIRTY-FOURTH ANNUAL REPORT

1957-58

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THIRTY-FOURTH ANNUAL REPORT OF THE IMPERIAL FORESTRY INSTITUTE ACADEMIC YEAR, 1957-58

Introduction. Work has proceeded smoothly and normally during the year, the chief event affecting the Institute being the Seventh British Commonwealth Forestry Conference in Australia and New Zealand, which necessitated the absence of the Professor for several months, and called for the preparation of papers on a number of subjects.

Students. The number attending courses throughout the year was forty-nine as compared with forty last year.

Twelve students were successful in the examination for the Forestry Honours degree. The classes obtained were six Seconds, four Thirds and two Fourths. Of these twelve, four were Probationers for the H.M. Overseas Civil Service and returned to their Colonies, one was a student from Ceylon who has returned to join the Ceylon Forestry Department, two obtained Research Fellowships and went to Canada for a year, one to the University of New Brunswick and the other to Toronto University; one emigrated to Canada; two found employment in the Forestry Branch of H.M. Overseas Civil Service, one going to Kenya and the other to North Borneo; one joined the Forestry Commission and the twelfth, from New Zealand, is remaining in Oxford for a further term in order to continue his work on his special subject on the populations of red deer.

There were nine students in the Third Year, four from overseas.

The Forest Officers' course was attended by eight officers from H.M. Overseas Civil Service. They came from British Honduras (1), Fiji (1), North Borneo (1), Nyasaland (1), Northern Rhodesia (2), Tanganyika (1), and Nigeria (Western Region) (1). One Forest Officer from Ghana attended for Trinity Term, and the Long Vacation. One Indian (from Bihar) and two Pakistani forest officers (from West Pakistan) also attended the course.

Four foresters were sent by Overseas Governments (two from Eastern Nigeria and two from Sierra Leone) for a two-year course specially arranged to meet their requirements.

Under arrangements made by the British Council, a Forest Officer from Libya spent a year here, and a Forest Officer from Burma studied at the Institute during Hilary Term and Easter Vacation. An Iranian Forest Officer completed his studies in Hilary Term and returned to Iran.

Research Students. One post-graduate student successfully submitted a thesis entitled: 'Pollen analysis in the study of the past vegetation and climate of the Ruwenzori and its neighbourhood' and

was awarded a B.Sc. Three students successfully submitted theses for the Diploma in Forestry. The theses were entitled: (1) 'The shrinkage of some Thailand Woods'; (2) 'A study of soil moisture and leaf water deficit, with special reference to the technique of measurement, and certain aspects of the afforestation of dry areas in Madhya Bharat'; and (3) 'A study of the development of working plans and their control with reference to the organisation of working plans in Western Australia'. Two other students are at present studying for the Diploma. The two students who last year were referred to as candidates for the degree of B.Sc., have now transferred to the status of Advanced Student, and are working for the D.Phil. degree. One student is working on a subject in forest economics for the B.Litt. degree.

Prizes. The Schlich Memorial Prize was awarded to T. M. Dow, Assistant Conservator of Forests, Northern Rhodesia. The School of Forestry Jubilee Prize was awarded to A. Ray, who has since been appointed as District Officer, United Kingdom Forestry Commission.

Instructional Tours: (1) *The Introductory Tour in Britain* for students starting the Final Honour School and others unfamiliar with British forestry was made as usual immediately before Michaelmas Term. The tour was conducted by Mr. T. E. Edwardson, accompanied by Mr. W. A. Gordon; an addition to the usual utilization visits was the new mill of Messrs. J. R. Gordon at Llandovery. Forests visited were the Dean, Tintern, Crumblands and Crychan of the Forestry Commission, and Mr. R. A. Banks's Hergest Croft Estate at Kington, Hereford, where the Forestry Consultant, Mr. A. E. Aitkins of Tilhill demonstrated some private forestry problems.

(2) *Western France.* The normal tour to Normandy and the Landes was conducted by Mr. Edwardson, the party comprising eleven undergraduates, four special course West African officers (2 from Eastern Nigeria and 2 from Sierra Leone), one officer from each of India (Bihar), Iran, Australia and Libya. The departure to Paris of M. Estranger (Lyons) and to Versailles of M. Valette (Alençon) has meant the loss of two old friends of this course. Of exceptional interest this year were the management and utilization problems at Lyons caused by a 21,000 cubic metre windblow in July 1957 and an excellent demonstration of sand movement overnight at Mimizan during a strong gale.

(3) *Eastern France and Switzerland.* The fourteen Fourth Year students visited forests in the Jura and Neuchatel during the Easter Vacation. The tour was conducted by Mr. F. C. Osmaston, assisted by Mr. Edwardson.

(4) *Postgraduate Tour in Great Britain.* This annual tour, showing aspects of current developments in British Forestry, was conducted by the Professor and Mr. W. A. Gordon, the party consisting of eighteen forest officers of the Overseas Civil Service and other students. Forests in Devon and Cornwall were visited, the State Forests being Dartmoor Forest, Bodmin and Glynn Forests, Haldon Forest

and Quantock Forest: the private estate forests visited were Dartington Woodlands Ltd., under the direction of Mr. W. E. Hiley, the Knightshayes Court Estate and Sawmill belonging to Sir John Heathcoat-Amory, Dunster Woodlands (Tilhill Forest and Advisory Co. Ltd.), Messrs. Stenners Factory at Tiverton, and Stourhead (Western) Estate (Mr. H. P. R. Hoare). To the Forestry Commission and the private owners and their agents the Institute expresses its thanks for their kind reception and excellent arrangements.

(5) *Italy.* Seven Forest Officers of the Overseas Forest Service, and four other Forest Officers, one from India, two from Pakistan and one from Ghana visited Italy and Sicily under the leadership of the Professor and Mr. Osmaston; Mr. J. J. MacGregor also joined this party. The thanks of the Institute are due to Signor A. Camaiti, the Director-General of the Ministry of Agriculture and Forestry in Rome, who planned the tour both in Italy and Sicily and permitted his assistant, Dr. Raffaello Bruno to accompany the party; also to Professor A. Pavari of the Stazione Sperimentale di Selvicoltura, who helped in the organization and who also permitted his assistant Dr. R. Morandini to accompany the party.

Utilization Course. Fourth Year students spent one day in the various sections of the Forest Products Research Laboratory at Princes Risborough. Some of the Overseas Forest Officers also took the opportunity to visit the Laboratory on the same day. Special thanks are due to the Director and those members of the staff who gave demonstrations, etc.

Vacational Practical Work. Arrangements were again made through Mr. A. P. Leslie, an officer of the Ontario Department of Lands and Forests, for practical forestry work during the vacation and three students worked for a time in the Ontario forests. Mr. Höjer, Chief of the Swedish Forestry Service, permitted his assistant, Dr. Irholm, to make arrangements for the employment of four students, and 5 others worked in Norway under arrangements kindly made by Professor Ihlen. Practical work of this nature is greatly appreciated by the students and the Institute is extremely grateful for these opportunities made possible by the personal help of the persons mentioned.

Excursions. During Trinity Term arrangements were made for Forest Officers to visit the following research centres and estates: Messrs. Wm. Mallinson's Timber Yards and Veneers, London; Alice Holt Research Station (Forestry Commission); Bowater Paper Corporation, Kemsley Hill; Cirencester Estate, the property of Earl Bathurst; the Directorate of Overseas Surveys at Tolworth; and the Forest Products Research Laboratory at Princes Risborough. They also attended an excellent demonstration of forest sawmills and new types of machinery arranged at Blackbushe Airport, Camberley, by the Forestry Commission. The Fourth Year students joined the Forest Officers' excursions to Cirencester Estate and the Forestry Commission demonstration. They also visited Bridge Street Sawmills, High

Wycombe; Windsor Great Park, and Baccombe Warren and Wendover.

The third year students visited local woods for field study of silviculture and soils. In Dr. Jones's absence the visits were conducted by Dr. G. W. Dimbleby and Mr. Osmaston. Wytham Wood has again proved useful for demonstration purposes.

Thanks are tendered to all who permitted students to visit their woods and work.

Discussions. During Michaelmas and Hilary Terms, weekly discussions of forest topics of general interest, selected by the members of the Forest Officers' course, were organized as usual. During Trinity Term, short papers in selected topics (usually the Forest Officers' 'Advanced Study') were presented by the same group, each paper being followed by discussion.

Seminars on Regeneration of Tropical Forests. Owing to the Professor's absence abroad, the four seminars usually held in Michaelmas Term, were held in Hilary Term.

Visiting Lecturers. The usual weekly series of invited lectures in Hilary and Trinity Terms was given. These lectures are primarily for the post-graduate class and deal mainly with topics not fully covered by the staff of the Department. The lectures were followed by discussions.

The subjects and lectures were :

Problems in Timber Utilization. Mr. B. Alwyn Jay. Timber Development Association, Ltd.

Timber from the Commercial Point of View. Mr. E. H. Richardson, of Messrs. Wm. Mallinson & Sons Ltd.

Small modern sawmills and their planning. Mr. T. A. Stodart, of Messrs. Stenners Ltd., Tiverton.

Timber Preservation. Mr. E. H. Nevard, Chairman of the Technical Committee of British Wood Preserving Association.

Forestry in a developing country. Mr. C. Swabey, Forestry Adviser, Colonial Office.

Rainfall: its variability and trends. Dr. R. P. Beckinsale, School of Geography, Oxford University.

Land Use Problems as affecting Forestry. Professor L. Dudley Stamp, C.B.E., The London School of Economics and Political Science.

The Thinning of Plantations. Mr. W. E. Hiley, C.B.E., Woodlands Manager, Dartington Woodlands Ltd.

Small Mammal Populations and Forestry. Mr. H. N. Southern of the Bureau of Animal Population, Oxford University.

The place of herbicides and arboricides in forestry practice. Professor G. E. Blackman, Department of Agriculture, Oxford University.

An agricultural economist looks at forestry. Mr. R. N. Dixey, Agricultural Economics Research Institute, Oxford University.

Aerial Survey and photo-interpretation. Mr. D. A. Francis, of Hunting Technical Services, Ltd., Herts.

Some problems of management planning in new forests. Dr. F. C. Hummel, in charge of Management Branch, Alice Holt Research Station, Forestry Commission.

- (1) *General developments in genetics and tree breeding*, and (2) *Practical examples of the application of breeding methods.* Mr. J. D. Matthews, Geneticist, Alice Holt Research Station, Forestry Commission.

Assistance from other Departments, etc. Special courses in surveying and soil science were given to the Forestry students by Dr. A. R. Robbins, of the Department of Surveying and Geodesy, and Dr. R. K. Schofield, of the Department of Agriculture. Dr. A. Muir, of Rothamsted Experimental Station, gave a course of lectures on Tropical Soils in Hilary Term. Mr. J. Fraser Scott, Assistant to the Reader in Biometry and Mr. G. B. Masefield, the University Lecturer in Overseas Agriculture, also gave courses to both the undergraduates and post-graduates. The thanks of the Department are extended to all lecturers concerned and the Heads of their Departments.

Assistance to other Departments, etc. In the absence of the Professor, Mr. Gordon lectured on Colonial Forestry to the Overseas Administrative Cadets at Oxford in Michaelmas Term, and the Professor, with the assistance of Mr. Gordon, lectured to the Overseas Administrative Cadets and Overseas Agricultural Service Officers at Cambridge during Hilary Term.

Staff Tours. The Professor was away from July, 1957 till January, 1958 in connection with the Seventh British Commonwealth Forestry Conference in Australia and New Zealand acting as Chairman of the Committee on Silviculture, Management, Protection, and Research. He visited Java and Bali on the way to see the famous Indonesian teak plantations, and their silvicultural research and plantation methods. A short pre-conference tour was made in the tropical rainforests of N. Queensland, New Guinea and New Britain, and a post-conference tour in the beech and softwood forests in the southern parts of South Island. On the return journey visits were made to the forests of Fiji, British Honduras, British Guiana, the Windward Islands and Antigua. An unofficial flying visit was also made to the *Araucaria* (Paraná pine) forests and plantations in Sao Paulo, Brazil. The excellent arrangements made by the local officers in all these places to ensure maximum interest and value in the short time available was very greatly appreciated and it was particularly gratifying to meet so many former students of the Institute throughout this long tour.

From 23rd March to 18th July Dr. Jones studied some of the outliers of dense high forest in Nigeria, which are locally frequent in the savanna of the Guinea Zone between the Jos Plateau and Minna. The work was sponsored by the Colonial Office and generously supported by the Nigerian Federal Government.

Dr. Leyton's visit to the U.S.A. and Canada was referred to in the last report.

Research Field Station. The Yorkshire station at Wykeham has again been used by members of the research staff. Acknowledgement

is made of the continued help given by the Silviculturist (North) of the Forestry Commission and by the Research Forester, Mr. Weatherell.

Scientific Societies, etc. Members of the staff have been active on the Councils and Committees of various societies, as in previous years.

Senior Staff. On the expiry of the grant from the Forestry Commission for biochemical research on forest soils, Dr. Raudnitz left the Department on 31st March, 1958.

Technical Staff. At the close of the year there were thirteen technical assistants working in the eight laboratories, the Photographer's and Artist's sections being staffed by two technicians, and the Workshops by three.

Secretarial Staff. There has been no significant change in the secretarial staff during the year.

WYTHAM WOODS

The planting of vacant land was continued and fifteen thousand transplants were used of oak, ash, beech and chestnut, in which were interplanted softwood nurses, chiefly larch, Douglas fir and spruce. The abnormally wet summer caused very heavy weed growth, especially of bracken and brambles, and weeding operations were prolonged. First thinning of the new plantations was continued (larch only). Rabbits have re-appeared in small numbers and deer continued to cause considerable damage in the plantations. A final yield of 110 mature timber trees was felled, while thinnings, chiefly in sycamore and ash coppice, produced a good yield of turnery poles. The total revenue for the year at £2,408 was the highest since operations began in 1946. Of the total, £204 was realised at an auction sale of conifer thinnings from the only older softwood plantation in the woods.

About 50 acres of vacant agricultural land that were added to the woodland area in exchange for part of Marley Wood, are being 'dedicated' for timber production, and the planting of this area will be started next autumn. As part of the same adjustment, a new compartment of 16 acres known as the Mount and already under woodland has been taken over while 7 acres of Compartment 8 are being surrendered for biological research.

A large unused barn was taken over to provide a sawmill shed and also long-needed shelter for the tractor and lorry. Two sawbenches are being installed and should greatly increase the revenue from firewood, from squared posts and split rails.

Preliminary work in revising the working plan was begun by Mr. Osmaston and enumerations of all trees over 6 in. quarter girth were completed in 200.4 acres in 12 compartments at a cost of £40. 15s. 7d. Another 52 acres in 5 compartments will be enumerated next year.

BAGLEY WOOD

The successful establishment of new crops under the current Working Plan is beginning to affect the appearance of some of the formerly less productive parts of the wood. Only the quite extensive heavy clay sites continue to present a difficult problem so, in early spring, a contract for the experimental mechanical drainage of two acres on the clay in Compartment 15 was undertaken by Messrs. Allan and Ford of Cowley. Spreading of the spill gave trouble, but the growth of the crop of oak and cypress planted immediately afterwards is promising.

The planting programme is up to prescription, but the thinning programme is in arrears largely because of the inadequacy of the labour available to carry out all the work prescribed under the current plan. The sawmill and timber storage space are both fully occupied.

To obtain more knowledge of the relative merits of sessile and pedunculate oak grown on the gravel soils, some 30 oak have been butt-hammered after identification by the Forest Botanist and it is hoped to follow them at a later stage through the mill and compare the timber for shake and rot.

Two differently thinned increment plots were established in the 1900 stored oak coppice in Laud's Copse, in view of the interest of these crops as the link in supply between the old oak and the new crops in about 30 years time.

With the generous help of the Forestry Commission, the Forestry Commission Geneticist has established for the interest of the School a seed orchard of élite European and Japanese larch in Compartment 40: in Compartment 15, a 'display' of the eleven parent Dunkeld Japanese larch, three of each, have been set out, and alongside a line of reputedly *Keithia*-resistant *Thuya*. Three stands of *Thuya* and a Lawson Cypress stand have been accepted by the Forestry Commission as registered seed sources.

Visitors to Bagley Wood in the year included the Southern Division of the Royal Forestry Society of England and Wales and Headington School.

Rabbits do not appear to be spreading, and netting has only been necessary in the north-east corner of the wood.

SILVICULTURE

Dr. E. W. Jones continued in charge of the section, with one assistant. He lectured to the Third and Fourth Year students, and gave practical classes in Silviculture to the Third Year students. Lectures were also given in the post-graduate course.

Dr. Jones joined the Working Plan party in the New Forest for part of their time.

The account of the British species of *Quercus* for the British Ecological Society's 'Biological Flora' has been completed.

In January several of the permanent transects in the Lady Park Biological Reserve, High Meadow Woods (near Coleford, Glos.) were re-enumerated.

The period from 23rd March—18th July was spent by Dr. Jones in Nigeria, studying some of the outliers of dense high forest which are locally frequent in the savanna of the Guinea Zone between the Jos Plateau and Minna. The work was sponsored by the Colonial Office and generously supported by the Nigerian Federal Government. Detailed study was concentrated on two sites—one in the Sanga River Forest Reserve, near Jemaa (Zaria Province), the other in the recently demarcated Bonu Forest Reserve about 45 miles east of Minna. The recently created Cece Forest Reserve near Badeggi-Lapai was also examined more briefly.

In the Trinity Term, Mr. Osmaston and Dr. Dimbleby jointly took the Third Year class in Practical Silviculture during Dr. Jones's absence in Nigeria.

ECOLOGY

The lectures in General Ecology to the Post-graduate course and in Temperate Ecology to the Third Year class were again given by Dr. Dimbleby.

The year has largely been devoted to the preparation of papers for publication. An account of the experimental work with hardwoods on heathland soils was completed and published as Institute Paper No. 33. A much bigger undertaking was Dr. Dimbleby's preparation of a detailed account of his work over the past years on soil genesis. This includes not only a full description of the techniques he has used, but particularly a presentation of the ecological and pedological data showing the complex changes which took place as forest was converted into heath. It has been made plain that the hand of man was the primary cause of this transition and it is shown how site degradation and soil degradation ensued. New light is shed on the relative importance of the various soil-forming factors, and the whole forms a background against which our efforts to restore this land should be seen. It is clear that much more work of a similar and also of a complementary nature will be needed before the problem of environmental degradation in such circumstances is fully understood. This work has only just been completed and the method of publication is under consideration.

TREE PHYSIOLOGY AND FOREST HYDROLOGY

Courses of lectures were given by Dr. L. Leyton in Forest Soils and Tree Physiology, studies of soil and vegetation being made in the field.

Continuing the work on nutritional relationships of forest trees, the analysis of data from a countrywide survey of Japanese larch and Sitka spruce is now approaching completion; results obtained so far indicate that whilst a substantial proportion of the variation in larch growth on different sites can be attributed to differences in mineral nutrition, mean site temperature over the growing season (as one measurable attribute of exposure) also plays a determinative role. To obtain a better physiological insight into these relationships, detailed

investigations have been made into the distribution of growth and nutrients in Scots pine at various stages of development during the growing season. Investigations have also been made into the nutritional relationships of *Pinus radiata* seedlings in sand culture employing a new irrigation technique.

As a beginning to the programme dealing with hydrological relations of the forest, Dr. A. Carlisle has initiated investigations into the interception of rainfall by the forest canopy. For a 22-year-old Lawson Cypress stand, loss by interception over the period June to September 1958 amounted to 18% (1.76 in. out of a total rainfall of 9.19 in.). Canopy saturation occurs after a rainfall of about 0.2 in. in a short period, after which interception is negligible. Stem flow also began at this rainfall intensity but over the whole period of measurement only amounted to about 0.1 in. These investigations are being extended to other species along with more comprehensive measurements including evaporation, soil moisture, infiltration etc. as a prelude to the analysis of the overall water balance.

SOIL SCIENCE

Special undergraduate lectures for forestry students were given by Dr. R. K. Schofield, Reader in Soil Science. Dr. Alex Muir again gave a course of lectures on tropical soils to the fourth year students and Forest Officers.

A course of lectures on soil organic matter and soil organisms was given to the third year students by Dr. W. R. C. Handley.

In collaboration with Dr. Leyton a short course on the study of soils in the field was given to third year students.

Efforts have continued to devise methods whereby soil processes, especially the production of mineralised nitrogen and carbon dioxide, can be studied in the laboratory under conditions approaching those of the natural environment as closely as possible. The microfaunal and microfloral populations are being maintained as far as possible. The effect of addition of the leaf litter of various plant species on the release of mineralised nitrogen and carbon dioxide from soil systems under these conditions is being investigated.

The stability in the presence of soil micro-organisms of the water soluble iron oxide solubilizing systems present in the leaf litter of various plant species has been studied by C. J. A. Shelbourne. Mr. Shelbourne has been awarded a Beaverbrook Fellowship in Forestry and will spend the coming year in the School of Forestry, University of New Brunswick.

Mr. J. F. Redhead of the Nigerian Forest Service (a Diploma candidate) made microscopical observations on the fungal associations of the roots of numerous indigenous and exotic Nigerian tree species. The work was carried out on material collected in Nigeria during 1956-57 from trees of various ages and growing under a variety of environmental conditions. The influence of added nutrients on the development of fungal associations in the roots of seedlings of six lowland rain forest tree species from Western Nigeria, growing under

glasshouse conditions in Oxford, is being investigated. Mr. Redhead has returned to Nigeria where he hopes to continue his observations on problems arising out of his studies at the Institute.

FOREST BOTANY

Mr. A. C. Hoyle continued as Curator of the Forest Herbarium, and Mr. F. White as Forest Botanist. In April, 1958, Miss G. M. Howland was appointed to fill the vacancy of Junior Technician. The rest of the permanent staff remained unchanged. In September, 1957, Mr. Hoyle and Mr. White attended the third General Assembly of the Association pour l'Etude taxonomique de la Flore d'Afrique tropicale in Paris, and both contributed short papers. After the assembly, Mr. White visited the herbaria in Brussels and Leiden.

Teaching. Mr. Hoyle gave his usual courses in Systematic Forest Botany and in the Ecology of Dry Tropical Woodlands, and supervised collecting by students. Mr. White provided a course of instruction in Tropical Forest Botany for five African students.

As in previous years a number of students and forest officers made use of the collections and literature in the herbaria. Three of them were supervised by Mr. White; Mr. S. C. Tamajong completed the course in Regional Systematic Botany (Nigeria) and presented as his thesis 'A study of variation in *Symphonia*'; Mr. J. Lang Brown wrote 'An ecological study of the grasslands of Kibale Forest, Uganda'; and Mr. T. McL. Dow prepared, with special reference to Northern Rhodesia, 'A study of the Pines of Mexico'. Another forest officer, Mr. E. G. G. Dykes, made a special study of the bark of some trees of British Honduras, under Mr. Hoyle's supervision and presented a thesis on 'The identification of timber trees using field characters, with special emphasis on Terminology'. Mr. Musa Daggash studied N. Nigerian grasses with Mr. Hoyle for a month during the summer vacation, 1957.

Research and Advisory Work. (1) *Brachystegia*. Mr. Hoyle continued his study, endeavouring to put together in a form more suitable for publication, the mass of information previously accumulated, and supervising the preparation of illustrations by Miss J. Chandler for his forthcoming review of the genus. Collections were named as received. Collaboration continued with M. Letouzey of the Service Forestière in French Cameroons, who supplied excellent material of a little-known forest species and its putative hybrid.

(2) *Ebenaceae*. 988 specimens of African Ebenaceae, including many type specimens which have been photographed, were received on loan from a number of European and African herbaria for the attention of Mr. White, who during the year published two more papers on this family viz., *Notes on the Ebenaceae III* contributed to the 'Volume Jubilaire Walter Robyns' of the *Bulletin du Jardin botanique de l'Etat*, Brussels and *Generic Characters in the Ebenaceae*, written in collaboration with Mr. R. D. Barnes, and based on the latter's Special Subject report.

(3) *Forest Flora of Northern Rhodesia*. During the year the illustrations were completed by Miss J. Chandler, and galley proofs of the first 105 families were received from the printers. Sorting of the duplicates of woody plants collected in Northern Rhodesia by Mr. A. Angus and Mr. White in 1952 was continued. 6,322 were distributed to other herbaria.

Visitors and Enquiries. A very diverse stream of visitors was helped in various ways. Among those who worked for short periods in the Herbarium were Messrs. R. A. Graham and N. K. B. Robson of Kew, K. H. Hemsley of the Nature Conservancy, Dr. H. Wild of the S. Rhodesian Government Herbarium and Dr. J. Léonard of Brussels. Enquiries from Forest Departments, sawmillers and private individuals, direct or through the Forest Products Research Laboratory, Princes Risborough, continued to be frequent and often required much critical work.

Forest Herbarium. The large amount of material received continued to be efficiently handled by Mrs. E. M. Woodley who, with the help of a part-time assistant, mounted 3,021 specimens. Specimens received totalled 1,235, of which 1,032 were sent by Forest Departments for identification, and 194 were presented by the Royal Botanic Gardens, Kew, and the National Herbarium, Pretoria. Material for naming came principally from the following territories: Ghana, Nigeria, Northern Rhodesia, Nyasaland, Portuguese East Africa, Sarawak and Uganda. 947 identifications were sent—to Nigeria (310), Northern Rhodesia (236) and Nyasaland (401).

FOREST PATHOLOGY

Mr. W. R. Day continued in charge of the section assisted by Mr. F. H. Jones (Chief Technical Assistant), Mr. D. K. Barrett and Miss J. S. Palmer. The usual courses of instruction were given to the Honour School and a course in Forest Hygiene to the post-graduate students. As usual various exhibitions dealing with problems in Forest Pathology were given.

Research (1) Moisture saturation determination in main stems. The work on Japanese larch, reported last year, showed that considerable variation in moisture content in the wood near the cambium may occur both within a tree and between trees according to their position on a site. The suggestion plainly is that some types of bark necrosis may find a favourable field for development in locally low moisture conditions; observations have been begun on Sitka spruce which show various types of fluting and death of bark, to determine whether they show any evidence that this is true. Preliminary results are encouraging.

(2) *Studies in 30 to 35 year old, even-aged, Spruce stands with reference to the development of fluting, bark necrosis and variations in crown density*. Reference to work of this nature has been made in past reports and it may be useful here to summarise some of the conclusions. Field studies suggest that there is a close association between conditions for root development, the development of fluting on

the base of main stems, the occurrence of bark necrosis in connection with this, regularity of growth between individual trees and the occurrence of loss of foliage density. The basic conditions appear to be those which determine the manner of root development and so efficiency in soil occupation and root action. Spruce plantations, and particularly Sitka spruce plantations, are characteristic of the more humid parts of the country and ordinarily occur on soils which permit only a very moderate, or often a shallow depth of rooting. This restriction of root development is compensated to some extent by the relatively moist, cool, climate; but eventually according to its degree, it is a basic factor in determining root disease or debility and through that the pattern of stand growth and canopy development and the occurrence of such phenomena as fluting, bark necrosis and drought crack. The following observations have been made:

(a) *Loss by early death.* Loss by death before first thinning, which may be expressed as a proportion of the total number of trees planted, seems to be a site characteristic. In pure Sitka spruce stands, which grew on sites of at least moderately good fertility, deaths have been observed to vary between 2 and 66 per cent. The mean of 24 counts made in Kerry Forest by Mr. Hji Yiannis gave 16.7 per cent. Plainly, the higher is the loss, the lighter the first thinnings tend to be. Death is considered to result mainly from competition and, according to observation so far, soil conditions have always been consistent with this.

(b) *Proportion of dominants within the stand.* Trees may survive until the first thinning and yet individually show very different growth rates. Relative evenness of individual growth produces a high proportion of dominants and *vice-versa*. The manner of canopy development in this way seems clearly to be determined mainly by soil conditions. It has been found that:

(i) The character of the early thinnings is largely determined by the distribution of sizes of tree throughout the stand: for any species the character of this distribution is a site characteristic; it may be observed to vary as the nature of the site varies.

(ii) A sparseness of dominants, resulting in a tendency to early development of a multi-storied canopy, seems usually to be associated with a tendency for an appreciable amount of root die-back to occur: this may happen before the first thinning.

(iii) Fungi such as *Fomes annosus* and *Armillaria mellea* may develop abundantly on such dead roots and before any thinning is made.

(iv) Death of trees does not necessarily follow to any high degree; but one or both of two things tends to happen: there may be an unduly high death rate throughout the stand with the usual concentration of death locally where site conditions are most severe; or there may be an early loss of foliage density, the dominants, at first at least, remaining the more densely foliated.

(v) Alternatively, if early thinning gives space for a relatively even development in size of tree, there is an early tendency,

according to the severity of site conditions, not to show any vigorous response in crown development to increased growing space so that an open canopy begins to develop. Some form of root debility seems always to accompany this. The early need to underplant ordinarily develops in this way or through related conditions described under (iv) above.

(3) *The occurrence of fluting on main stems of young trees.* The following observations have been made in 30 to 35 year old spruce stands growing on soils which, in the main, permit only shallow root development :

(a) Sites which prevent the full development of heart roots favour the development of fluting : the occurrence of a small number of horizontal root junctions with the main stem also favours it.

(b) Fluting induced after this manner develops only when a certain size of tree has been reached. It accordingly tends to appear first on dominants and is favoured by heavy thinnings which are made to stimulate development of dominants.

(c) Death of bark within the flutes commonly takes place where fluting is at all severely developed. The dead bark need not extend down to a root or to the base of the tree at any point.

(d) Fluting commonly arises between two main root junctions : e.g. a Sitka spruce in Kerry Forest showed four flutes each with living bark. The heart roots were strongly suppressed owing to subsoil consolidation and there were only four main root inlets at the base of the main stem : a flute arose above each inter-root space.

(e) Drought cracks on the bole also arise above such inter-root spaces and not uncommonly develop in shallow flutes. In the same way narrow, slightly spiral lines of bark necrosis arise above inter-root spaces. Drought crack is determined by stress for water supply and there is thus indirect evidence that fluting of the type discussed is also related to local conditions of supply to the meristem.

(f) Fluting commonly develops above wounds made on main roots, or at the base of the bole, during extraction of thinnings. Death of bark in the flutes may also occur. The wound plainly interrupts supply and thus provides direct experimental evidence that fluting in the absence of wounds may be caused by a local depression of supply to the meristem.

(g) Severe basal fluting has developed on Western hemlock (*Tsuga heterophylla*) after the death of heart roots with which infection by *Fomes annosus* was associated. The flutes developed on the main stem between the junction of the still living large horizontal roots and above the junction of dead heart roots. This is also evidence that the development of fluting is related to local conditions of supply.

(h) There is preliminary evidence that within a well developed flute, with the bark still living, the moisture saturation is lower within the flute than on either side of it.

(4) *Die-back of shoots and canker development on Black pines.* Re-examination of work done in 1944 suggested that water deficiency

was one of the basic factors involved. Further data were collected in view of the persistence of these phenomena in Corsican pine plantations.

Mention must be made of the helpful co-operation and interest in work, of the technical assistants, without which little could have been accomplished.

FOREST ENTOMOLOGY

Mr. G. H. Thompson continued in charge of this section in which there were no staff changes. The usual undergraduate courses were given in Forest Zoology and Animal Ecology. An advanced course in Forest Entomology was given to one forest officer from North Borneo. Three fourth year students undertook zoological special subjects.

Research. The fifth annual examination was made of ash and sycamore billets laid down in 1953 in Wytham Wood for the study of insect succession. Considering that five years have elapsed since the trees were cut and the billets laid on the soil the timber of both species was surprisingly sound. Less than 25% of the bark remained on the sycamore but more than 80% was present on the ash; in both species the bark was very loose. Beneath the bark the fauna was much the same as last year, consisting mostly of molluscs, annelids, woodlice, centipedes, millipedes and a few Tipulid and other dipterous larvae. The advent of woodborers in the ash was marked by the presence of Pyrochroid larvae superficially in the sapwood, and larvae of the Lucanid *Sinodendron cylindricum* L. at greater depth.

Ecological studies continued on the alder woodwasp (*Xiphydria camelus* L.) and its parasites. Host location and details of the act of oviposition and the structure of the ovipositor were studied in *Pseudorhyssa alpestris* Holmgren and *Rhyssella curvipes* Grav. Measurements were made of the rate of growth of the larva of *Aulacus striatus* Jur. in relation to the growth of the woodwasp host. Progress has been made in the identification of the fungus associated with the alder woodwasp.

MANAGEMENT

Mr. F. C. Osmaston remained in charge of management in which undergraduate courses were unchanged. The first course for third year undergraduates included 24 lectures in Hilary and Trinity Terms, a tour in Normandy and the Landes in March-April, and four weeks practical work in the New Forest in September. The second course for fourth year undergraduates included 16 lectures in Michaelmas and Hilary Terms, two weeks practical work in the New Forest in March, and a tour in the French and Swiss Jura in April.

Lectures were given by Mr. Osmaston, and supplemented by Mr. Edwardson and Mr. W. A. Gordon with some further lectures on aspects of management particularly applicable to Britain and tropical Commonwealth countries, respectively.

In the New Forest the practical work consisted in the preparation of a full working plan by each student for an area of 543 acres. The

area was selected to provide variations in site conditions and growing stock which included both conifers and hardwoods having qualities and age-class distribution typical of many English woods. Problems to be solved therefore included choice of species, conversion or retention of hardwood high forest, afforestation of heathland and attainment of sustained yields as well as satisfaction of amenity demands. The practical work was in two parts. In September the basic data were collected—soil, site and vegetation assessment, stock mapping and compartment description, enumeration of growing stock. Each student then wrote and submitted in October Part I of his plan which was returned to him after criticism in December. Objects of management were given to the students in March so that on their second visit to the New Forest they could write their full plan with prescriptions in Part II and check in the field both their previous work and the application of the prescriptions.

Supervision and assistance were also given to post-graduate students, particularly a Burmese Forest Officer studying for a doctorate on modern methods of yield regulation and management and their application to Burma, and a forest officer from Western Australia who obtained a Diploma for his thesis on the organization of working plans.

Besides his tours in the New Forest and the French and Swiss Jura, Mr. Osmaston also went to Italy in June-July with a class of Forest Officers.

Mr. Osmaston gave a course of lectures on Silvicultural Systems to undergraduates and 3 lectures on special points in management to post-graduate students.

MENSURATION

Teaching. The customary undergraduate course, including practical work in Bagley Wood was given by Mr. Edwardson. A shortened course on selected points in mensuration (mainly volume tables and inventory) was given in the post-graduate course. The intention next year is to combine this course with selected points in management.

Two undergraduates undertook mensuration special subjects: one investigated the value of the Prodan-Schneider volume increment per cent. tables for Norway spruce in Britain, and the other investigated the value of Finch's claims for the correlation of Forestry Commission (Hummel) tariff with top height of the crop.

Mr. J. F. Scott (Unit of Biometry) attended the enumeration part of the Working Plan course for a few days and advised on design of lay-out and analysis of data.

Research. Investigation continued on suitable tariff series for both conifers and hardwoods in connection with the enumeration of the growing stock of the Forest of Dean. Further stratification was also introduced, by sub-division of conifers into utilization groups and by the recognition of four topographic sub-divisions. A decision by the Forestry Commission to prepare a joint Working Plan for High-meadow and Dean Forests in 1959, has intensified the investigational

work, in which much greatly appreciated help is being given by Mr. J. F. Scott of the Unit of Biometry.

Supervision was given to Mr. N. B. Lewis, Working Plans Officer, South Australia, on his Diploma study of thinning ideas and practices in Europe: arrangements were made for him to visit a number of specialists in Holland, North Germany, Denmark, Sweden and Norway, followed later by visits to Forestry Commission and private areas in North England and Scotland and then a return to Europe to study both thinning and general management problems in the Black Forest, Eastern France, Switzerland, Bavaria and Austria. Mr. Edwardson also supervised the advanced study of Mr. R. A. Smart of Northern Rhodesia of punch-card machine methods of assembling and analysing inventory data.

Miscellaneous. Mr. Edwardson advised Headington School and Harlow New Town respectively on the planting of amenity trees and the protection of old trees in newly built up areas. He spoke to Oxford Young Farmers and, in the Woods, to the School of Geography about aspects of British Forestry; he was also appointed to the panel of examiners for the National Diploma in Forestry.

AERIAL SURVEYS

The course of eight lectures on Aerial Survey, with practical work in interpretation of aerial photographs and mapping from them was given to post-graduate students by Dr. A. R. Robbins of the Survey Department and Mr. F. C. Osmaston. Some fourth year undergraduates also attended the classes.

In addition, Mr. D. A. Francis, in charge of Aerial Forest Surveys of Messrs. Hunting Technical Services Ltd., gave a special lecture on the use of aerial photographs in Forestry, while in Trinity Term a special visit was paid to the Directorate of Overseas Surveys at Tolworth where the whole process of map-making from aerial photographs was seen.

STATISTICS

By arrangements with the Reader in Biometry, Mr. J. Fraser Scott gave a course of lectures on elementary statistics for Forestry students.

Mrs. Allington's computing work has continued much as usual.

WOOD ANATOMY

Dr. L. Chalk continued in charge of the section with Mr. A. A. Shaw and Mr. P. G. H. Franklin as his assistants. The usual undergraduate and post-graduate courses were given. Two undergraduates carried out special subjects in this field.

Research. (1) *The shrinkage of rays and fibres in wood.* Mr. Wijesinghe investigated the shrinkage of sections of *Artocarpus integra* Merr. and *Canarium zeylanicum* Bl. from Ceylon and of *Acer pseudoplatanus* from Great Britain. By dissections to isolate ray and fibrous tissues it was shown that the anisotropic shrinkage of these woods was due to at least two separate factors. The rays have a

definite influence, but the tangential shrinkage of isolated fibres was still appreciably greater than the radial shrinkage when these cells were isolated by dissection. The relative importance of these two factors varied in the different species.

(2) *Diagnostic differences between the woods of Sessile and Pedunculate Oak.* Mr. C. H. Murray applied the criteria recommended by Huber, Holdheide and Raack to material obtained from thinnings of 40-45 year old plots of these species in Bagley Wood. Much of the material was below the minimum ring width stipulated by Huber, but even in samples with the necessary ring width the two species could not be separated by means of Huber's characters or by other features that were tried. It was concluded that the two species cannot be distinguished by their woody characters.

(3) *Seasonal variation in tracheid form in the wood of conifers.* Mr. J. Ladell's work on this subject has been mainly devoted to developing and testing methods of wall thickness and lumen diameter and their relation to density.

Terminology. The International Glossary of Terms used in Wood Anatomy was published by the International Association of Wood Anatomists in *Tropical Woods* (No. 107, pp. 1-36, 1957). Plans are being considered for the projected illustrated multilingual version.

The Wood Collection. The principal additions to the collections received during the year were from Nigeria through the Forest Herbarium, Ibadan, Nigeria, from Jamaica, through the Forest Department, from the Sudan through Hunting Technical Services Ltd., and from Uganda, through J. W. P. Martin Esq. The collection now contains about 19,500 wood specimens including about 7,000 species; these are supplemented by the slide collection with over 10,000 slides.

FOREST ECONOMICS

Mr. J. J. MacGregor remained in charge of this section. Mr. F. E. Balman and Mr. T. W. Irvine were mainly concerned with the economic survey of forestry on private estates in England and Wales, and in analyses of volumes and prices of imported timber. Miss J. M. Johnson has been responsible mainly for secretarial work and preparation of survey reports. Miss Alice Wickenden assisted in the survey report on a part-time basis.

Teaching. Lectures and tuition in Economic Theory and in Forest Economics were given to final year students. Seminars and study groups for forest officers were also arranged.

Research. In addition to the preparation of the Fifth Annual Report on the Survey of Private Forestry Costs in England and Wales the main activity has been associated with the preparation of a special report on the accumulated evidence of the first five years of the Survey. The section continued to obtain data on prices of home grown timber.

With the help of the appropriate forest officers abroad a comparative study was prepared of the methods of revenue collection in the

Commonwealth Forestry Departments. An article on forestry price index numbers, showing series of data up to 1957, and a study of the lessons for the forest industry to be derived from agricultural experience of marketing methods, were prepared.

Supervision. The forest economist acted as supervisor for two post-graduate studies for B.Litt. and D.Phil. degrees on the subjects of the position of hardwoods in Britain's forest economy and on the competition for resources between agriculture and forestry.

Conferences. The forest economist attended the annual meeting of the Society of Foresters of Great Britain at Norwich, and an informal meeting convened by Sir Henry Beresford-Peirse at Northerwood House to discuss the subject of 'The Management of Coniferous Crops'. He was also invited in the summer of 1958, to attend the International Conference of Agricultural Economists held in India in August and September, 1958, but was unable to attend. A talk, followed by discussion, was given to the Agricultural Club at Reading University on the competition between Agriculture and Forestry.

Foreign Tours. The forest economist was a member of the tour arranged for forest officers to the Italian mainland and Sicily, and made preliminary arrangements for a visit next year for study of Land Use problems.

FOREST LAW, TAXATION AND ADMINISTRATION

British Forest Law, etc. Mr. W. A. Gordon gave a course of 20 lectures on British Forest Law, Land Tenure and Taxation to a class of 12 post-graduate and fourth year undergraduates. Three candidates chose this field for the additional subject in the Final Honour School of Forestry.

Mr. Gordon was Chairman of Examiners for the Final Honour School of Forestry.

Mr. Gordon also conducted two seminars for post-graduates on the Law of Evidence and Contract, and gave lectures on the legal aspects of Forest Protection to the third year students.

Colonial Forest Administration. Mr. Gordon gave a course of 12 lectures to a class of 15 graduates and undergraduates. Six candidates took this subject as their additional subject in the Final Honour School of Forestry.

FOREST UTILIZATION AND ENGINEERING

A course of twenty lectures in Forest Utilization was given by Colonel Lloyd to third and fourth year students; also sixteen lectures in Forest Engineering, followed by field work and a road and bridge project. Practical forestry work was arranged for individual students during the vacations in Norway, Sweden and Canada. Visits were made to various sawmills, a plywood factory and a chip-board factory. As usual, the third year students spent a day at the Forest Products Research Laboratory. By arrangement with the Forestry Commission, individual students specially interested in modern methods of forest

road construction visited new extraction-road work in Wales and in the North of England.

The Overseas Forest Officers attended a course in the maintenance of motor vehicles at the Land-Rover School at Coventry and were also given facilities to attend a more general course in car maintenance and repair at the City of Oxford Technical College. A practical course in the sharpening of saws and maintenance of tools was given in the Institute workshops. New films on timber extraction in West Africa and in Canada were also shown. Discussions were held on timber grading and utilization.

An exhibition of Forestry Tools and Machinery, arranged at Blackbushe Airport by the Forestry Commission, was attended by Forest Officers and students. Modern fire-fighting equipment, as well as timber conversion and bush clearing machines were demonstrated.

The timber storage yards and veneer showrooms of Messrs. Malinsson and Sons were visited as usual. At Messrs. Stenners' sawmill factory at Tiverton, new types of portable band-saws were demonstrated. Visits to paper-mills and other wood-using industries were arranged for individual Forest Officers.

The Lecturer in Engineering continued to be a member of the Council of the British Wood Preserving Association and was also a member of the Technical Committee of the British Standards Institution.

FOREST PROTECTION

The usual course of lectures on Fire Protection and counter erosion methods were given by Colonel Lloyd. Three lectures on the legal side of forest protection were given by Mr. Gordon and on economic aspects by Mr. MacGregor. A forest officer from Libya was given a short course in methods of control of shifting sands and, with the help of the Forestry Commission, visited the Culbin Sands in Scotland.

SURVEYING

The usual course in Surveying was given in the Trinity Term by Dr. A. R. Robbins of the Department of Surveying to the third year students.

LIBRARY

Miss G. Guiney continued in charge of the Library, with Mr. E. F. Hemmings maintaining the Catalogues, and Mrs. D. R. Cloke as assistant. Miss S. M. Bishop left the Department in March, 1958.

Statistics, with last year's figures bracketed, are :

Accessions :

Issues of periodicals	...	...	...	2000	(2015)
Current annual reports	...	...	...	200	(201)
Books	...	...	...	155	(224)
Miscellaneous (pamphlets, etc.)	...	...	...	1710	(1757)
Maps	...	...	...	46	(88)
Total	...	...	...	4111	(4285)

The Commonwealth Forestry Bureau deposited 261 (315) items : by direct request 45 (109) were obtained.

The number of books in the Library is now about 12,400; maps, 590; sets of periodicals, 635; current periodicals, 247; separate series (except reports and working-plans), about 1,600 sets; pamphlets and reprints, some thousands.

Loans :

To Staff:

Periodicals

In circulation	2808	(2754)
Direct	223	(194)
Books	158	(265)
Miscellaneous	246	(256)

Total	3435	(3469)
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To students

Periodicals	187	(258)
Books	1030	(974)
Miscellaneous	490	(505)

Total	1707	(1737)
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To visitors and correspondents

Periodicals	281	(290)
Books	80	(68)
Miscellaneous	509	(354)

Total	870	(712)
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To Bureau

Periodicals	500	(426)
Books	47	(60)
Miscellaneous	305	(190)

Total	852	(676)
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Total loans :	6864	(6594)
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There has been a marked increase of loans to outside borrowers (mainly by post), as well as to the Bureau. Postal lending is valuable and beneficial but greatly increases work.

New periodicals entered, 12 (7) : one each from Argentine, Chile, Czechoslovakia, Malaya, United Kingdom, United States of America, Yugoslavia; 2 from China, 3 from Germany.

New series, including annual reports, 37 (57); one each from France, Kenya, Japan, New Zealand, Persia, Spain, Sweden, Tanganyika, Venezuela; 2 each from Australia, Finland, International, Italy, United Kingdom, Yugoslavia; 4 from Canada; 4 from Germany; 8 from United States of America.

Correspondence : Letters sent, 1801 (1816), received 1041 (1026).

Sales of Institute Publications : £72. 3s. 5d. (£98. 10s. 5d.).

Catalogue Room. For the first time the intake of cards into the main indexes was less than in the previous year. 24,044 (25,436) cards were filed; 16,064 were subject cards and 7,980 author. The slight relief in filing was balanced by instructional work undertaken.

The stock-copy collection was maintained. It now contains useful runs of the more important periodicals, and frequently obviates the necessity of parting with main library sets for loans.

The Commonwealth Forestry Bureau's Centralized Title Service produced some 679,128 (516,742) cards and 'flimsies' on the Multilith duplicating machine and distributed to 90 (79) recipients.

Exchange. In addition to our normal exchange relations with other institutions (British and foreign) embracing major Institute publications, we began a few years ago a tentative exchange of reprints of articles by members of the staff with both institutions and individual persons, 10 or more copies of each reprint being provided by the author. This activity has proved so successful that we hope to expand it.

Library Bulletin. This is now in its seventh volume of 12 issues. It is mainly a list of new books, periodicals and series, and is useful to an increasing number of extra-mural readers.

Visiting trainees. Several persons were delegated by their Governments to study library methods and the practical use of the Oxford Decimal Classification for Forestry. These included Mr. Jon Hjeltnes of Vollebek, Norway (2 weeks); Mr. Rubardy Martasamita of Bogor, Indonesia (2 months); Dr. H. A. Luckhoff of Pretoria (2 weeks); Mrs. Bogajska of Kitwe, Northern Rhodesia; and Miss Ruth Nixon of Reading University.

Staff. In September Miss D. R. Castell, Assistant Librarian, became Mrs. Malcolm Cloke, but remained on the staff. In March Miss S. M. Bishop resigned. In June applications were received for the post of Librarian, Miss Guiney's term of office being about to end, and Mr. E. F. Hemmings, Assistant Librarian, was appointed to assume duties on 1st October, 1958.

Mrs. Ladell (Canada) and Mrs. Walker (Tasmania) were employed part-time to repair pamphlets, and thanks are due to both for excellent work.

Cost. During the year the Library expenses amounted to £4,464, £3,631 of which were on staff salaries and the balance on books, periodicals, binding and equipment.

General. Reclassification of the books from the 'Flury' to the 'Oxford' system was almost completed. A new edition of the *Basic List of Books for Forest Libraries* was prepared, and additions and amendments to the *World List of Scientific Periodicals* and the *British Union Catalogue of Periodicals* were typed from our records.

It is proposed to seek a partial solution of the pressure on space by fitting shelves along one side of the corridor adjoining the library.

The usual introductory talks were given to undergraduates and Forest Officers at the beginning of Michaelmas Term.

Visitors. Mr. Carlson (Oregon State College), Professor N. Polunin (Baghdad University), M. Baumer (Paris), Mr. Henry Clepper (Society of American Foresters), Dr. Friedrich (Reinbek), Mr. Watterson (Rome), Dr. D. Clement (Atkins Garden, Cuba), Mr. Angus (Fiji), Professor C. Troll (Bonn), Mr. John Pitt (Brazil), Professors Faik Tarsanoglu, Saatcioglu, and Eraslan (all of Istanbul University), Mr. Gordon Westman (Montreal), and 14 members of the Executive Council of the Commonwealth Agricultural Bureaux.

Gifts. All donors, especially those whose interest has been long maintained, are warmly thanked. Notable additions have been made by members of our staff, and others; mention can be made of but a few: Dr. Carlisle, (Ledebour's *Pinus silvestris* L. var. *sibirica*, 1833); Dr. Chalk, papers by Seabra and Griers; Dr. Dimpleby, three reports by Yanamaka, Kochi University; Mr. Edwardson, Der Stadtwald von Freiburg im Breisgau; Dr. L. G. Romell (Sweden), two papers by himself; Professor Verkuyl, University of Indonesia, Bogor, Natural timber reserves of Borneo, 1949; Professor S. H. Spurr, University of Michigan, Ann Arbor, two copies of his bibliography 1887-1953 on forest photogrammetry and aerial surveying; Mr. P. de Schlippe, 4 Chaussée de Waterloo, Brussels, four of his papers on shifting cultivation, etc.; the Sherardian Professor of Botany, Annual Reports towards completing our set, also reprints; the Director of Forestry, Rangoon, Burma, 25 working plans; the School of Agriculture, Estates Management, Cambridge, 10 books; O Chefe dos Serviços Repartição Técnica de Estatística, Lorenzo Marques, Mozambique, Dendrologie de Moçambique, by A. F. Gomez e Sousa, 1949, Vol. II (completing our set).

PHOTOGRAPHIC SECTION

During the year the following major items were dealt with by the Photographer, Mr. Woodward:

Prints and enlargements	...	...	4276 (6025)
Negatives processed	...	...	1016 (1200)
Photomicrographs and photos taken	...	...	220 (554)
Lantern slides	...	...	56 (128)
Maps mounted on hangers	...	...	378 (—)

There was no technical assistant in the section most of the year.

WORKSHOPS

The workshops continued with two metal workers, Mr. E. J. Howell and Mr. I. Abbott, and Mr. J. W. Howkins in the wood-working shop. Among the more important apparatus and equipment made during the year were:

Eight cabinets, a large cupboard with sliding doors, a bench unit in the wood-working shop, and 31 rain gauges, installation of air line and spraying equipment in the green houses and 17 Copenhagen tank germinators made or modified in the metal shop.

APPENDIX I PUBLICATIONS GENERAL

Original Publications

Forestry in Great Britain, the Commonwealth and Europe, by A. H. Lloyd, *Encyclopaedia Britannica* 'Book of the Year'.

The article on 'Forests and Forestry' by H. G. Champion, for the *Children's Encyclopaedia Britannica* was revised by W. A. Gordon.

Review

A World Geography of Forest Resources. Edited by the American Geographical Society. The Ronald Press Co., New York. *Magazine of the Royal Geographical Society* (W. A. Gordon).

ECOLOGY

Original Publications

Experiments with Hardwoods on Heathland, by G. W. Dimbleby. Institute Paper, No. 33.

Report on Pollen Analysis, by G. W. Dimbleby (In Excavation of a Barrow near the Hardy Monument, Black Down, Portesham, Dorset, by M. W. Thompson and P. Ashbee). *Proc. Prehist. Soc.* 23 : 130-6.

Reviews

Site degradation in stands of natural pine in Scotland, by D. C. Malcolm. *Forestry* 31 : 102-3 (G. W. Dimbleby).

Tree root development on upland heaths, by C. W. Yeatman. *Forestry* 31 : 108-10 (G. W. Dimbleby).

TREE PHYSIOLOGY

Original Publications

The mineral nutrient requirements of forest plants, by L. Leyton. *Encyclopaedia of Plant Physiology*, IV : 1026-39. Springer-Verlag, Berlin, 1958.

The mineral nutrient requirements of forest trees, by L. Leyton. *Ohio J. Science* 57 : 337-45, 1957.

Forest fertilizing in Britain, by L. Leyton. *Journal of Forestry* 56 : 104-6, 1958.

Tree relationship between the growth and mineral nutrition of conifers, by L. Leyton. *The Physiology of Forest Trees*, 323-45. The Ronald Press Co., New York, 1958.

Root growth of tree seedlings in relation to aeration, by L. Leyton and L. Z. Rousseau. *The Physiology of Forest Trees*, 467-75. The Ronald Press Co., New York, 1958.

Review

Forest fertilization: a bibliography, with abstracts, on the use of fertilizers and soil amendments in forestry, by D. P. White and A. L. Leaf. *Forestry* 31: 100-01 (L. Leyton).

SOIL MICROBIOLOGY

Original Publications

The production of polysaccharides by fungi active in the decomposition of wood and forest litter, by B. Bernier. *Canadian Journal of Microbiology* 4: 195-204, 1958.

A laboratory study of nitrogen mobilization during litter decomposition, by R. T. Fenton, *Plant and Soil*, X: 202-4, 1958.

BOTANY

Original Publications

Generic Characters in the Ebenaceae, by F. White and R. D. Barnes. *Journal of the Oxford University Forestry Society*, Fourth Series, No. 6: 31-34, 1958.

Notes on the Ebenaceae, III. *Diospyros monbuttensis* and two related Species, by F. White. *Bull. Jard. Bot. Brux.* 27: (Volume Jubilaire Walter Robyns): 515-31.

Two new combinations in *Maerua* Forsk., by F. White. *Bol. Soc. Brot.* 32: 33-35.

PATHOLOGY

Original Publications

The distribution of mycelia in European larch bark, in relation to the development of canker, by W. R. Day. *Forestry* 31: 63-86.

Variations in the susceptibility of European larch of differing seed origin in Scotland to injury by experimental freezing, by W. R. Day. *Scottish Forestry* 12: 143-6.

Reports to Forestry Commission

Problems relating to the growth of forest on shallow soils, by W. R. Day. Duplicated, 25 pp. 12 photos. 12 figs. March, 1958.

The conditions of Sitka Spruce in older plantations in State forests in Central Wales, by W. R. Day. Typed: 25 pp. 13 figs. August, 1957.

Notes on growth conditions in Myherin and Tarenig Forests, by W. R. Day. Typed: 5 pp. July, 1958.

MENSURATION

Review

Sapinières (Silver fir stands): Selected Working by Area (Check method by means of curves), by A. Schaeffer, A. Gazin and A. D'Alberny. Translated by M. L. Anderson, Bull. 3 Forestry Department, University of Edinburgh. *Forestry* 31: 106-8. (T. E. Edwardson).

WOOD STRUCTURE

Original Publications

The International Glossary of Terms used in Wood Anatomy, published by International Association of Wood Anatomists. (Committee on Nomenclature) (Dr. L. Chalk). *Tropical Woods* 107: 1-36.

Variations in cell size and cell wall thickness in Norway spruce, *Picea abies* Karst, by G. B. Jones (Edited by L. Chalk). *Journal of the Oxford University Forestry Society*, Fourth Series, No. 6: 35-43.

ECONOMICS

Original Publications

Survey of Private Forestry Costs, England and Wales, Fifth Annual Report for forest years 1954-55 and 1955-56, by J. J. MacGregor, F. E. Balman and T. W. Irvine. *Department of Forestry, Imperial Forestry Institute, University of Oxford*, December, 1957. Pages 92.

European and Near East Experience of Planned Land Use. Paper prepared for the Seventh British Commonwealth Forestry Conference, 1957, by J. J. MacGregor. Reprinted in *Journal of Chartered Surveyor's Institute*. February, 1958.

Woodland Marketing and the Watson Committee's report, by J. J. MacGregor. *Journal of the Royal Agricultural Society*, 118: 76-87.

Revenue Collection in Commonwealth Forestry Departments, by J. J. MacGregor and T. M. Dow. *Department of Forestry, Imperial Forestry Institute, University of Oxford*, July, 1958. Pages 42.

FOREST LAW, TAXATION AND ADMINISTRATION

Original Publication

The Law of Animals, by W. A. Gordon. *Journal of the Oxford University Forestry Society*, Fourth Series, No. 6: 22-24 (1958).

APPENDIX II

I. STAFF ENGAGED IN INSTRUCTION AND RESEARCH

- PROFESSOR SIR HARRY CHAMPION, C.I.E., M.A., D.Sc. (Oxon.).
Tropical Forestry, Forest Policy.
- L. CHALK, M.A., D.Phil. (Oxon.). Wood Structure and Properties.
- W. R. DAY, B.Sc., M.A. (Oxon.). Pathology, Forest Hygiene.
- E. W. JONES, M.A. (Oxon.), Ph.D. (Cantab.). Silviculture.
- G. H. THOMPSON, B.Sc., M.A. (Oxon.). Forest Zoology, Entomology.
- T. E. EDWARDSON, M.A. (Oxon.), B.Sc. (For.) (Edin.). Mensuration,
British Forestry.
- W. A. GORDON, M.A., Dip. Anth. (Oxon.), Bar. at Law (Lond.).
Colonial Forestry, Forest Law.
- F. C. OSMASTON, M.A. (Oxon.). Forest Management, Aerial Survey.
- J. J. MACGREGOR, B.Sc. (Glasgow), M.S. (Wisc.), B.Litt., M.A.
(Oxon.). Forest Economics.
- W. R. C. HANDLEY, M.A. (Oxon.), Ph.D. (Leeds). Tree Physiology.
- L. LEYTON, M.A. (Oxon.), Ph.D. (Leeds). Tree Physiology.
- G. W. DIMBLEBY, B.Sc., M.A., D.Phil. (Oxon.). Forest Ecology.
- A. CARLISLE, B.Sc. (For.) (Bangor), Ph.D. (Aberdeen). Forest
Hydrology.
- A. C. HOYLE, B.Sc., M.A. (Oxon.). Forest Botany and Ecology.
- F. WHITE, M.A. (Oxon.), M.A. (Cantab.). Forest Botany.
- H. RAUDNITZ, Ph.D. (Prague). Chemistry. (Until 31st March, 1958.)

II. STAFF OF OTHER UNIVERSITY DEPARTMENTS ASSISTING IN INSTRUCTIONAL WORK

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